

REMARKS:Status

After entry of this response, claims 1 to 5, 7 to 22, 24 to 39, 41 to 51, and 72 to 85 will be pending. Claims 6, 23 and 40 have been cancelled, claims 1, 7, 8, 18, 24, 25, 35, 41 and 42 have been amended, and claims 72 to 85 have been added herein. Claims 1, 18, 35, 72 and 79 are the independent claims. Entry of this response, reconsideration and further examination are respectfully requested.

Claim Rejections

Claims 1 to 6, 18 to 23, and 35 to 40 were rejected under 35 U.S.C. § 102(b) over U.S. Patent No. 5,864,655 (Dewey). Claims 7 to 10, 12 to 17, 24 to 27, 29 to 34, 41 to 44, and 46 to 51 were rejected under 35 U.S.C. § 103(a) over Dewey. Claims 11, 28 and 45 were rejected under § 103(a) over Dewey in view of U.S. Patent No. 5,666,511 (Suganama).

Rejected Claims

Claim 1 as amended is reproduced below:

An apparatus, including
a mass storage device including one or more disk drives, each disk drive having a plurality of storage blocks, each of said storage blocks including a plurality of sectors, said storage device using parity data for error detection;
wherein each storage block of said plurality of storage blocks includes a data portion and an error code portion, said data portion storing

data for said storage block, and said error code portion being responsive to said data portion; and
wherein said error code portion includes a checksum of said data portion.

This claim recites use of parity data for error detection in conjunction with subject matter from previously pending claim 6 regarding checksums. The applied art is not seen to disclose or to suggest this combination.

The rejection of claim 6 in paper no. 6, which was referenced in the outstanding Office Action, indicated that Dewey taught a checksum operation at col. 1, lines 34 to 37, and Figure 7A. However, as explicitly stated by Dewey at this very location, the cited operation is a parity operation “calculated bit-by-bit for all five data blocks (such as with an exclusive-OR algorithm).” An exclusive-OR operation, for example for a parity calculation, is not equivalent to a checksum.

In this regard, the rejection of claim 6 in paper no. 6 stated that “an exclusive-OR is a checksum operation.” Applicants respectfully disagree. While various forms of checksums exist, all involve either counts of bits in data or mathematical formulas performed on data values. Applicants are not aware of any checksums that simply perform an exclusive-OR operation on data values. An operation that solely performs exclusive-OR operation on data values is not a checksum, but rather is a parity operation.

The application as filed clearly differentiates between a checksum and a parity operation. The application discusses the benefit of using these two different types of error checking operations together. Namely, the combination enables a capability of catching errors

other than data errors, for example sector slides and misdirected disk access operations. See, e.g., page 6, lines 1 to 6, of the application.

In support of Applicant's contention that checksum are different from exclusive-OR and parity operations, Applicants note that the word "checksum" does not even appear once in any of the references applied against the claims in paper no. 6, which includes the two references applied in the outstanding Office Action. However, "parity" is discussed in all three of those references.

Applicants also note the Examiner's reasoning in the rejection of claim 9 in the outstanding Office Action. The rejection of that claim states that "one of ordinary skill in the art at the time the invention was made would have been highly motivated to use additional checksums to increase the error protection of the data portion and the error correction portion." Based on such reasoning, one skilled in the art might be motivated to add endless checksums and other error correcting data in a vain attempt to endlessly improve error correction capability. However, it is well known in the art of error correction that each new level of error correction carries with it added processing burdens and also more data (i.e., the checksums themselves) that can be corrupted. Thus, in order to justify use of multiple forms of error correction, some other motivation is required.

In the present case, Applicants' combination of parity data and checksums has such a motivation. Namely, this combination provides the aforementioned capability of catching errors other than data errors, for example sector slides and misdirected disk access operations.

Applicants respectfully submit that without even mentioning the word “checksums,” the applied art cannot provide such a motivation.

In view of the foregoing, claim 1 is believed to be allowable over the applied art. Such action is respectfully requested, as is allowance of the claims that depend from claim 1.

Amended independent claims 18 and 35 both recite use of parity data in combination with checksums. Accordingly, those claims and the claims that depend therefrom also are believed to be allowable. Such action is respectfully requested

New Claims

New independent claims 72 and 79 recite that “said parity data and said checksum data in combination are capable of detecting at least bit errors in said data, sector slides in said data, and misdirected disk access operations.” The explicit recitation of the benefit of using both parity data and checksum data is believed to further distinguish these new claims from the applied art. Accordingly, allowance of claims 72 and 79, as well as their dependent claim, is respectfully requested.

Closing

In view of the foregoing amendments and remarks, the entire application is believed to be in condition for allowance, and such action is respectfully requested at the Examiner’s earliest convenience.

Applicants' undersigned attorney can be reached at (614) 486-3585. All correspondence should continue to be directed to the address indicated below.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Dane C. Butzer". The signature is fluid and cursive, with the first name "Dane" being the most prominent.

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